

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 122176x261	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/NZ2003/000118	International Filing Date (day/month/year) 9 June 2003	Priority Date (day/month/year) 9 June 2002
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ B02C 25/00, 19/06		
Applicant METSO MINERALS (MATAMATA) LIMITED et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

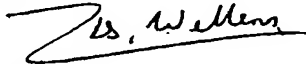
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheet(s).

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 8 January 2004	Date of completion of the report 23 March 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  MR KIM WELLENS Telephone No. (02) 6283 2162

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages 1- 14 , as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 15- 18., received on 16 March 2004 with the letter of 16 March 2004
- ☒ the drawings, pages 1- 2 , as originally filed,
pages , filed with the demand,
pages , received on with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/NZ2003/000118

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1- 22	YES
	Claims	NO
Inventive step (IS)	Claims 1- 22	YES
	Claims	NO
Industrial applicability (IA)	Claims 1- 22	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

D1- AU 200242410 A1 (General Electric Canada Inc.), 28 November 2002

D1- AU 199959442 A1 (Tata Consultancy Services (a Division of Tata Sons Ltd.), 31 August 2000

D2- WO 01/76756 A2 (J&L Fiber Services, Inc.), 18 October 2001

D3- US 4662571 A (MacDonald, deceased et al.), 5 May 1987

D4- US 3970257 A (MacDonald et al.), 20 July 1976

D5- US 5145118 A (Canada), 8 September 1992

D6- Derwent Abstract Accession No. 92- 282189/34, Class P41 SU1681953 A1 (Ferr Metal Ore Enrichment Agglomeration), 7 October 1991

Novelty (N) and Inventive Step (IS) claims 1- 22

Claim 1- 22 relates to a method for, and control system adapted to, calibrating a control system for a rock crusher to maintain a cascade ration in spite of varying amount of material supplied to the crusher. The claims defines that the method and system involve fixing the settings of the crusher's controls to known positions, observing the cascade ratio at varying throughput rates and resetting the settings of the crusher's control mechanism to match the actual observed cascade ratio.

None of the documents D1- D6 either individually or in obvious combination disclose a method or control system of claims 1- 22. Consequently claims 1- 22 are novel and involves an inventive step.

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Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
P, A AU 2002424101	28 November 2002	22 May 2002	25 May 2001

**Date of written disclosure referring to
non-written disclosure
(day/month/year)**

WHAT WE CLAIM IS:

1. A control system for a rock crusher, said control system being adapted to control a cascade ratio of said crusher, wherein a portion of material entering the crusher is placed into cascade, and the remainder of said material entering the crusher is supplied to a crusher rotor,

the control system including a processing means, said processing means being adapted to receive a throughput signal from at least one throughput sensor,

said processing means also being adapted to transmit at least one control signal to at least one control mechanism of the crusher,

wherein at least one control signal or signals are transmitted to each control mechanism to adjust the amount of material entering the crusher rotor to provide a specific cascade ratio for said crusher in response to a variable throughput for said crusher.
2. A control system as claimed in claim 1 wherein the rock crusher is a vertical shaft impact crusher.
3. A control system as claimed in either claim 1 or claim 2 wherein at least one control signal is transmitted to at least one control mechanism for a rotor gate for the crusher.
4. A control system as claimed in any one of claims 1 to 3 wherein the control signal is transmitted to a control mechanism for a crusher feed-in mechanism.
5. A control system as claimed in either claim 3 or claim 4 wherein the control mechanism has variable settings.

6. A control system as claimed in any one of claims 1 to 5 wherein the cascade ratio is defined as the ratio of amount of material passing through the crusher rotor to the amount of material cascading past the rotor concurrently.
7. A control system as claimed in claim 6 where the cascade ratio is calculated with reference to weight of material passing through the crusher
8. A control system as claimed in either claim 6 or claim 7 where the cascade ratio is calculated with reference to the volume of material passing through the crusher
9. A control system as claimed in any one of claims 1 to 8 where the amount of material supplied to the crusher varies over time.
10. A control system as claimed in any one of the claims 1 to 9 wherein the processing means includes a programmable logic device.
11. A control system as claimed in claim 10 wherein the programmable logic device is a programmable logic controller.
12. A control system as claimed in either claim 10 or claim 11 wherein the programmable logic device is adapted to receive specific or target cascade ratio information from a user of the control system.
13. A control system as claimed in any one of claims 10 to 12 wherein the programmable logic device is adapted to receive a throughput signal from at least one throughput sensor.
14. A control system as claimed in claim 13 wherein the throughput sensor is provided throughput signal through at least one belt weigher.
15. A control system as claimed in any of claims 10 to 14 wherein the

programmable logic controller is adapted to transmit at least one control signal to one or more control systems of the rock crusher.

16. A control system as claimed in any one of claims 1 to 15 which includes an element which is adapted to display information to the user of the crusher.
17. A control system as claimed in claim 16 wherein the element adapted to display information is a display panel.
18. A control system as claimed in any one of claims 1 to 17 adapted to receive a power consumption signal from drive elements or motors associated with the crusher.
19. A control system as claimed in claim 18 wherein the power consumption signal is a motor current value for motors used to drive the rotor.
20. A method of calibrating a control system as claimed in any one of the previous claims, characterised by the steps of:
 - (i) fixing the settings of the crusher's control mechanism at known positions or values, and
 - (ii) observing the cascade ratio for the crush at varying throughput values, and
 - (iii) resetting the settings of the crusher's control mechanism to match the actual cascade ratio observed.
21. A control software for a rock crusher control system, wherein a portion of material entering the crusher is placed into cascade and the remainder of said material entering the crusher is supplied to the crusher rotor, said software being said control software being adapted to execute the steps of;

- (i) receiving target cascade ratio information, and
 - (ii) receiving a throughput signal indicative of the current crusher throughput, and
 - (iii) determining changes to be made in the settings of the rock crusher's control mechanism or mechanisms to achieve the target cascade ratio, and
 - (iv) transmitting at least one control signal to a control mechanism to implement the changes required in the settings of said control mechanism or mechanisms.
22. A control system substantially as herein before described and with reference to Figure 1.
22. Control software substantially as herein before described and with reference to Figure 2.